IN THE CLAIMS

Claims 1-71 (Cancelled)

72. (Original) A process for at least partially removing oxygenate impurities from an olefin-containing stream produced by an oxygenate to olefin process which comprises:

contacting an oxygenate feedstream with an olefin generation catalyst under conditions sufficient to provide a first product stream which contains C_2 to C_4 olefins, C_2 to C_4 paraffins, hydrogen, methane, oxygenates comprising dimethyl ether, and highly unsaturated C_2 to C_4 by-products comprising a member selected from the group consisting of an alkyne and an alkadiene;

exposing at least a portion of said product stream or stream derived therefrom to a supported metal catalyst comprising i) at least one member selected from the group consisting of group 8 (VIIIA) metal, group 8 (VIIIA) metal compound, group 9 (VIIIA) metal, group 9 (VIIIA) metal compound, group 10 (VIIIA) metal, group 10 (VIIIA) metal compound, group 11 (IB) metal, and group 11 (IB) metal compound, of the Periodic Table, and ii) at least one of a porous inorganic oxide and microporous crystalline molecular sieve, said exposing taking place at conditions sufficient to convert said dimethyl ether to at least one higher boiling product; and

removing at least some of said higher boiling product.

73. (Original) The process of claim 72 wherein said exposing is carried out in the presence of hydrogen and said supported metal catalyst is a hydrogenation catalyst.

74. (Original) The process of claim 72 wherein said exposing is carried out in the absence of hydrogen.

75. (Original) The process of claim 72 wherein the C_3 to C_4 olefin fraction of said product stream or stream derived therefrom contains at least about 1 mppm oxygenates comprising dimethyl ether.

76. (Original) The process of claim 72 wherein said alkyne comprises a member selected from the group consisting of acetylene, methyl acetylene, ethyl acetylene and dimethyl acetylene, and said alkadiene comprises a member selected from the group consisting of propadiene, 1,2-butadiene and 1,3-butadiene.

77. (Original) The process of claim 76 wherein the C_2 olefin fraction of said product stream or stream derived therefrom comprises at least about 1 mppm of acetylene.

78. (Original) The process of claim 76 wherein the C_3 olefins fraction of said product stream or stream derived therefrom comprises at least about 1 mppm of methyl acetylene and/or at least 1 mppm of propadiene.

79. (Original) The process of claim 76 wherein the C_4 olefins fraction of said product stream or stream derived therefrom comprises at least about 1 mppm of a member selected from the group consisting of ethyl acetylene, dimethyl acetylene, 1,2-butadiene and 1,3-butadiene.

80. (Original) The process of claim 72 wherein said catalyst comprises at least one member selected from the group consisting of group 10 (VIII) and group 11 (1B) metals.

81. (Original) The process of claim 72 wherein said catalyst comprises palladium.

82. (Original) The process of claim 72 wherein said catalyst comprises at least one of i) at least one porous inorganic oxide selected from the group consisting of silica, alumina, silica-alumina, zirconia, titania, aluminophosphate and clay, and ii) at least one microporous crystalline molecular sieve selected from the group

consisting of silicates, aluminosilicates, substituted aluminosilicates, aluminophosphates, and substituted aluminophosphates.

83. (Original) The process of claim 72 wherein said catalyst further comprises iii) a member selected from the group consisting of a sulfur-containing moiety and oxygen-containing moiety.

84. (Original) The process of claim 72 wherein said exposing conditions are carried out in the liquid phase and comprise a temperature ranging from about 20 °C to about 100 °C, total pressures ranging from about 150 psig to about 600 psig, LHSV ranging from about 0.1 to about 100, and a hydrogen/(alkyne +alkadiene) ratio ranging from about 0.1 to about 100 on a molar basis.

85. (Original) The process of claim 72 wherein said exposing conditions are carried out in the vapor phase and comprise a temperature ranging from about 20°C to about 600°C, total pressures ranging from about 0.1 psig to about 600 psig, GHSV ranging from about 100 to about 20,000, and hydrogen partial pressure ranging from about 0.001 psig to about 200 psig.

86. (Original) The process of claim 72 wherein said conversion of said dimethyl ether to at least one higher boiling product is at least about 20%.

87. (Original) The process of claim 72 wherein said conversion of said dimethyl ether to at least one higher boiling product is at least about 50%.

88. (Original) The process of claim 72 wherein said conversion of said dimethyl ether to at least one higher boiling product is at least about 80%.

89. (Original) The process of claim 72 wherein said at least one higher boiling product is formed from the reaction of dimethyl ether with a member selected from the group consisting of said alkyne, said alkadiene and said propylene.

90. (Original) The process of claim 89 wherein said alkyne comprises methyl acetylene, said alkadiene comprises propadiene, and said higher boiling product is selected from a member selected from the group consisting of acetone and methylisopropyl ether.

91. (Original) The process of claim 72 wherein additional amounts of a member selected from the group consisting of alkyne and alkadiene are added as necessary, to react during said exposing with unreacted oxygenate.

92. (Original) The process of claim 73 wherein said exposing is carried out under conditions sufficient to effect at least partial hydrogenation of said a member selected from the group consisting of alkyne and alkadiene at a conversion of at least about 20%.

93. (Original) The process of claim 73 wherein said exposing is carried out under conditions sufficient to effect at least partial hydrogenation of said member selected from the group consisting of alkyne and alkadiene at a conversion of at least about 50%.

94. (Original) The process of claim 73 wherein said exposing is carried out under conditions sufficient to effect at least partial hydrogenation of said a member selected from the group consisting of alkyne and alkadiene at a conversion of at least about 80%.

95. (Original) The process of claim 73 wherein said exposing is carried out under conditions sufficient to effect at least partial hydrogenation of said member selected from the group consisting of alkyne and alkadiene so as to provide a member selected from the group consisting of ethylene, propylene and butene.

96. (Original) The process of claim 72 wherein said removing of said higher boiling product is carried out by fractionating in a distillation column.

97. (Original) A process for at least partially removing oxygenate impurities from an olefin-containing stream produced by an oxygenate to olefin process which comprises:

contacting an oxygenate feedstream with an olefin conversion catalyst under conditions sufficient to provide a first product stream which contains water, C_{5+} organic compounds, ethylene, propylene, butylenes, oxygenates comprising dimethyl ether, and unsaturated C_2 to C_4 by-products comprising a member selected from the group consisting of an alkyne and an alkadiene;

at least partially removing said water, ethylene, butylenes and C_{5+} organic compounds from said first product stream to provide a second product stream enriched in propylene relative to said first product stream, and comprising a member selected from the group consisting of an alkyne and an alkadiene, and containing dimethyl ether;

exposing at least a portion of said second product stream in the presence of hydrogen to a hydrogenation catalyst comprising i) at least one member selected from the group consisting of group 8 (VIIIA) metal, group 8 (VIIIA) metal compound, group 9 (VIIIA) metal, group 9 (VIIIA) metal compound, group 10 (VIIIA) metal, group 10 (VIIIA) metal compound, group 11 (IB) metal, and group 11 (IB) metal compound, of the Periodic Table, and ii) a member selected from the group consisting of a porous inorganic oxide and microporous crystalline molecular sieve, said exposing taking place at conditions sufficient to simultaneously effect 1) conversion of said dimethyl ether to at least one higher boiling product, and 2) at least partial hydrogenation of said member selected from the group consisting of alkyne and alkadiene; thereby providing a third product stream; and

removing said higher boiling product from said third product stream.

98. (Original) The process of claim 1 wherein said converting step is carried out in the presence of H_2O with an acid catalyst under conditions sufficient to at least partially convert said oxygenate impurity to its corresponding alcohol(s).

99. (Original) The process of claim 98 wherein said oxygenate impurity is dimethyl ether and said corresponding alcohol is methanol.

100. (Original) The process of claim 99 wherein said product stream comprises propane.

101. (Original) The process of claim 99 wherein said catalyst is a non-shape selective acid catalyst.

102. (Original) The process of claim 101 wherein said acidic catalyst comprises gamma-alumina.

103. (Original) The process of claim 99 wherein said conditions comprise a temperature ranging from about 300°C to about 800°C and a weight ratio of said dimethyl ether to said H_2O of no greater than about 2.5.

104. (Original) The process of claim 99 wherein said conditions comprise a temperature of at least about 500° C and a weight ratio of said dimethyl ether to said H_2O ranging from about 1.2 to about 2.5.

105. (Original) The process of claim 99 wherein said conditions comprise a temperature ranging from about 600°C to about 800° C and a weight ratio of said dimethyl ether to said H_2O ranging from about 0.5 to about 2.5.

106. (Original) The process of claim 99 wherein said conditions provide at least about 25% to about 95% conversion of said dimethyl ether to methanol.

107. (Original) The process of claim 106 wherein said conditions provide at least about 90% conversion of said dimethyl ether to methanol.

108. (Original) The process of claim 107 wherein said conditions provide at least about 92% conversion of said dimethyl ether to methanol.

109. (Original) The process of claim 100 wherein said propane-containing stream is derived from an oxygenate to olefins conversion process effluent.

110. (Original) The process of claim 99 wherein at least some of said H_2O is steam.

111. (Original) The process of claim 99 wherein at least some of said H_2O is separated along with said methanol in said separation step.